


# Chapter 1 Review

## Important Terms, Symbols, Concepts

### ■ 1.1. Linear Equations and Inequalities

- A **first degree, or linear, equation** in one variable is any equation that can be written in the form  $ax + b = 0$  where  $a$  is not equal to zero. This is called **standard form**.
- If the equality sign in the standard form is replaced by  $<$ ,  $>$ ,  $\leq$ , or  $\geq$ , the resulting expression is called a **first degree, or linear, inequality**.
- A **solution** of an equation (or inequality) involving a single variable is a number that when substituted for the variable makes the equation (or inequality) true. The set of all solutions is called the **solution set**.

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- 1.1. Linear Equations and Inequalities (continued)
  - If we perform an operation on an equation (or inequality) that produces another equation (or inequality) with the same solution set, then the two equations (or inequalities) are **equivalent**.
  - Equations are solved by adding or subtracting the same quantity to both sides, or by multiplying both sides by the same nonzero quantity until an equation with an obvious solution is obtained.

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## ■ 1.1. Linear Equations and Inequalities (continued)

- Inequalities are solved in the same manner as equations with one important exception: If both sides of an inequality are multiplied by the same *negative* number or divided by the same *negative* number, then the direction or sense of the inequality will reverse ( $<$  becomes  $>$ ,  $\leq$  becomes  $\geq$ , and so on).
- A suggested strategy can be used to solve many work problems.
- A company breaks even if revenues  $R =$  costs  $C$ , makes a profit if  $R > C$ , and incurs a loss if  $R < C$ .

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- 1.2. Graphs and Lines
  - A **Cartesian or rectangular coordinate system** is formed by the intersection of a horizontal real number line, usually called the  **$x$  axis**, and a vertical real number line, usually called the  **$y$  axis**, at their origins.
  - The axes determine a plane and divide this plane into four quadrants, labeled I through IV.

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- 1.2. Graphs and Lines (continued)
  - Each point in the plane corresponds to its **coordinates** - an ordered pair  $(a, b)$  determined by passing horizontal and vertical lines through the point.
  - The **abscissa** or  **$x$  coordinate**  $a$  is the coordinate of the intersection of the vertical line and the  $x$  axis.
  - The **ordinate** or  **$y$  coordinate**  $b$  is the coordinate of the intersection of the horizontal line and the  $y$  axis.
  - The point with coordinates  $(0,0)$  is called the **origin**.

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- 1.2. Graphs and Lines (continued)
  - The **standard form** for a linear equation in two variables is  $Ax + By = C$ ,  $A$  and  $B$  not both zero. The graph of this equation is a line, and every line in a Cartesian coordinate system is the graph of a linear equation.
  - The graph of the equation  $x = a$  is a **vertical line** and the graph of  $y = b$  is a **horizontal line**.
  - If  $(x_1, y_1)$  and  $(x_2, y_2)$  are two distinct points on a line, then  $m = (y_2 - y_1)/(x_2 - x_1)$  is the **slope** of the line.

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## ■ 1.2. Graphs and Lines (continued)

- The equation  $y = mx + b$  is the **slope-intercept form** of the equation of the line with slope  $m$  and  $y$  intercept  $b$ .
- The **point-slope form** of the equation of the line with slope  $m$  that passes through  $(x_1, y_1)$  is  $y - y_1 = m(x - x_1)$ .
- In a competitive market, the intersection of the supply equation and the demand equation is called the **equilibrium point**, the corresponding price is called the **equilibrium price**, and the common value of supply and demand is called the **equilibrium quantity**.

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## ■ 1.3. Linear Regression

- If the variables  $x$  and  $y$  are related by the equation  $y = mx + b$ , then  $x$  and  $y$  are **linearly related** and the slope  $m$  is the **rate of change** of  $y$  with respect to  $x$ .
- **Regression analysis** is used to fit a curve to a data set, usually with the aid of a graphing calculator or a computer.
- A graph of the points in a data set is called a **scatter plot**.
- A regression model can be used to **interpolate** between points in a data set or to **extrapolate** or predict points outside the data set.